DELIVERABLES – 05/03/04

PRE DESIGN

Project Program

Identify specific project issues and design performance requirements (all information and data gathered should be included in the Project Program identify information source for each item):

- Architectural Program
  - Functional Requirements
  - Functional Relationships (Bubble Diagrams and or Matrices)
  - Square Foot Area Requirements
  - Dimensional Requirements and / or Limitations
  - Unique Design Parameters
  - Interpretative program
- Site Program
  - Functional Requirements
  - Functional Relationships (Bubble Diagrams and or Matrices)
  - Square Foot Area Requirements, parking requirements
  - Dimensional Requirements and / or Limitations
  - Unique Design Parameters
  - Interpretative program
- Site Analysis
  Identify specific site issues and requirements (all information and data gathered should be included in the Project Program; identify information source for each item) and prepare the Site Analysis (Narrative/graphic format) based on checklist:
  - Topographic Analysis
  - Slope Analysis
  - Analysis of Physical Features
  - Access and Circulation, Traffic and Parking Studies
  - Vegetation
  - Existing Water Bodies
  - Site History
  - History of Existing Structures and Landscape
  - On-site Utility Studies
  - Off-site utility studies
  - Environmental studies and reports
  - Climate Studies
  - Geotechnical/soils
  - Hydrologic studies, watershed modeling studies
  - Project Requirements
  - Existing conditions assessment, hazmat investigation

Environmental Screening Form

- Use NPS Template

Class C Construction Cost Estimate

- Anticipated square footage and building type
- Anticipated site development including existing and proposed facilities
- Anticipated mechanical and electrical needs (i.e., will the structure be heated and/or cooled?)
- Anticipated structural systems
- Anticipated utility needs (i.e., will the site require leach field or well?)
- Anticipated utility systems
- Class C Construction Cost estimate - may be based on square foot cost or unit cost

Cost Comparability Analysis

- Cost Comparability Analysis for a minimum of three similar built projects

Document Scope and Cost Variations

- Document all scope and cost variations relative to the PMIS Project Statement and PMIS Class C cost estimate.

SCHEMATIC DESIGN

Schematic design documents include design alternatives, Value Analysis, and Final Schematic Design/DAB Submittal with class B estimate.

Environmental Assessment or Environmental Impact Statement Activities

- Public and Agency scoping
- Data Collection
- Agency Consultations and other required activities

Schematic Design Alternatives

- Drawings, which may be AutoCAD or free-hand, may include:
  - Site plan
  - Grading plan
  - Demolition plan
  - Site layout plan
  - Site details
  - Planting plan
  - Floor plans
  - Typical sections
  - Typical elevations
  - Utility plan
  - Process diagrams
  - Character sketches

- Presentation Options
  - Physical Study Model
  - Computer-generated three dimensional Model
  - Film or digital images
  - Power Point Presentation
  - Color hand-drawn perspective and oblique drawings

Schematic Design Preferred Alternative

The schematic design preferred alternative documents include building and site plans, elevations, and sections in sufficient detail to illustrate the functional and programmatic requirements of the preferred alternative from the Value Analysis. The preferred alternative is fully developed to adequately define the buildings, site development and systems including structural, mechanical, electrical, water and wastewater analyses; energy analysis; and materials analysis.

- Final Schematic Design documents shall include the following:
  - Building and site plans
  - Elevations and sections
  - Basis of Design Report (BDR):
    - Narrative and drawings that capture all aspects of the project including descriptions of engineering systems, building, site and utility design; structural, mechanical, electrical, water and wastewater analyses; energy analysis; and materials analysis. The report includes:
      - Project Program
      - Civil Engineering
        - Storm Water Management
        - Utility Corridor
        - Roadway and Parking
      - Landscape Architecture
        - Functional Analysis of Project program
        - Roadway and parking siting and analysis
        - Vegetation and Planting
        - Materials Analysis
        - Character Defining Features listing (cultural landscape)
        - Statement of Historic Significance (cultural landscape)
      - Water/Wastewater Systems
        - Code analysis and verification
        - Descriptions of water/wastewater systems and alternatives
        - Design flow calculations
        - Fire flow requirements
        - Results of soils testing, e.g. percolation test results
        - Results of sampling and testing of wastewater, etc.
        - Utility corridor or routing
        - Calculations for utility system sizing
        - Modeling

- Special studies, e.g. hazmat

Architecture and Preservation Architecture

- Code Analysis
- Functional Analysis of Project program
- Materials Analysis (Interior and exterior materials and finishes)
- Character Defining Features listing (historic structures)
- Statement of Historic Significance (historic structures)

Structural Systems

- Code and loading requirements
- Foundation system
- Roof and floor framing systems
- Lateral load-resisting elements

Mechanical Systems

- Descriptions of alternative mechanical systems
- Summary of energy analysis calculations
- Mechanical code review, listing special code requirements
- Adequacy of site utilities for mechanical systems, based on actual measurements of flow and pressure available or based on information from local utility companies
- Justifications for and descriptions of preferred alternative mechanical systems

Electrical Systems

- Descriptions of electrical systems and alternatives
- Load summary and calculations
- Adequacy of site utilities for electrical systems based on information from local utility companies; verification of phase and voltage available
- Electrical code review, listing special code requirements
- Discussion of telecommunication, fire, and intrusion

Energy Analysis

- Comparison of energy source alternatives, including renewable energy
- Life cycle costing for value analysis of mechanical system alternatives
- Preliminary mechanical system sizing
- Energy analysis for US Green Building Council's (USGBC) LEED certification
- Energy budgeting for proposed facilities

Class B Construction Cost Estimate

Class “B” estimate consists of a combination of lump sum (when quantities are known) items and unit price items when quantities are unknown. Estimate is based on:

- Basic layout of site and building plans and sections in sufficient detail to assist in quantity take-off. Plans and

sections can be later used in the preparation of design development drawings.
    - Schematic mechanical and electrical systems design (may be in the form of written analysis, based upon available information)
    - Preferred alternative drawings
    - Outline specifications, including cut sheets, of proposed equipment, fixtures or specialty items which may significantly influence estimate
    - Cost estimate shall be prepared utilizing samples.
- Final Schematic Design documents may include the following:
  Renderings and illustrative plans
  Color hand-drawn perspective and oblique drawings
  Computer-generated three dimensional model
  Physical study model
  Photographs or digital images
  Microsoft PowerPoint presentation

DESIGN DEVELOPMENT

The design development documents shall embody adequate architectural, landscape architectural, civil, structural, mechanical, and electrical drawings showing plans, elevations, sections, details, notational information, outline specifications, updated Class B estimate and other data at a level of completeness equivalent to approximately 40% completed construction drawings.

Drawing Minimums

- Standard cover sheet (with park map and project location map)
- Index sheet (may be included on cover sheet)
- General:
  Overall site plan showing total project:
    Contractor staging areas (construction storage, field office, construction camp) with adequate space or sequencing needs
    Construction limits
    Construction access
    Datum information, survey control
    Monuments and benchmarks with coordinates and elevations
    Property lines with bearings, easements, utility corridors and setbacks
    Unique construction requirements
  Sheet index, symbol legend and abbreviations list
  Existing conditions plan:
    Contours and spot elevations
    Benchmarks with coordinates and elevation

Property lines with bearings, easements and setbacks
Buildings and other structures
Site features: roads, parking, structures, walks, steps, walls, etc.
Utilities, above and below ground, shown to scale (transformers, pull boxes, manholes, inlets, lift stations, propane tanks, septic tanks, culverts, etc.) include spot elevations for each, invert elevations for all below ground structures
Existing vegetation
Boring data
Construction Limits

- Civil Engineering
  - Utilities plans:
    - Existing conditions (as base)
    - Geotechnical testing areas, boring locations, percolation test holes
    - Water systems and components: collection, treatment, and distribution layouts
    - Sewage disposal systems and components: location, size, profile, layout
    - Construction Limits
  - Road and Parking Layout:
    - Typical x-sections, alignments, profiles
    - Road and parking centerline and curve data
    - Intersections and other site radii identified with radius and coordinates
  - Storm water structure design and layout
    - System schematics and flow diagrams
  - Key and unique project details

- Landscape Architecture
  - Demolition Plan (if required):
    - Existing conditions (as base)
    - Structures
    - Plant material (tree protection, plants to be removed or salvaged)
    - Utilities (identified for removal or abandonment)
    - Site furnishings
    - Clearing and grubbing
    - Rock outcrops
    - Construction Limits
    - Storm water protection measures
  - Site Plan:
    - Existing conditions (as base)
    - Major Site features: roads, parking, structures, site drainage, walks, steps, walls, etc.
    - Utilities shown to scale (lighting, transformers, pull boxes, manholes, inlets, lift stations, propane tanks, septic tanks, culverts, etc.)

Sections and elevations identified
Major Site elements and details identified
Construction Limits

Site layout plan:
Existing conditions (as base)
Monuments and benchmarks identified with coordinates and elevation
Roads, parking, walks and service areas locating:
- Dimensioned traffic markings
- Dimensioned walks, steps, terraces, and site elements

Buildings and structures:
- Finish floor elevations noted
- Roof overhangs

Outdoor lighting
Above and below ground utilities
Construction Limits

Grading plan:
Existing conditions
Existing contours and spot elevations
Proposed grading:
- Proposed contours (maximum 2' contour interval with each 10' interval in heavier pen weight and labeled)
- Spot elevations of key walks, ADA accessible routes, walls, parking, drainages and site elements
- Spot elevations at top and bottom of walls, steps and ramps
- High points, low points, swale centerlines
- Finish floor elevations at each access point of structures

Tree and vegetation protection
Utility systems
Construction Limits

Planting/Revegetation/Irrigation plan

Site Elevations:
Entrances
Exterior materials with major site elements
Dimensions

Site Sections (One longitudinal and one transverse):
Typical section through site
Stairs
Site Walls

- Architectural

Compliance Drawings (Historic Structure Report Drawings are similar) Annotated floor plans, elevations, roof plans, and building sections that illustrate the anticipated impact or effects of recommended treatments to historic structures (typically for SHPO review).

Demolition Drawings (typically historic structures)

Floor Plans
Roof plans
Elevations
Building Sections

New or Adaptive Use Drawings

Building Floor Plans:
- Spaces individually delineated and labeled
- Section cut references
- Enlarged layouts of special spaces
- Dimensions

Building Roof Plan:
- Drainage design
- Roof slope
- Dimensions

Building Elevations:
- Entrances, window arrangements, doors
- Exterior materials with major vertical and horizontal joints
- Roof levels
- Dimensions

Building Sections (One longitudinal and one transverse):
- Floor to floor dimensions
- Stairs and elevators
- Typical ceiling heights

General roof construction details
Roof and Window details
Typical and special construction details
Interior elevations
Reflected ceiling plans
Room finish, hardware, door and window schedules
Equipment layout
CONDOC type notes are not acceptable
Keynote Legend shall be on the same sheet as keynote reference

- Structural

General Notes
Applicable Codes and Standards
Listing of design loads in accordance with IBC 2000, Section 1603
Listing of all structural materials used, including material strengths
Diaphragm fastening requirements
Requirements for special inspection IBC 2000, Chapter 17
List of abbreviations
Symbols legend

Standard Details
Standard details applicable to the project
Control joint details
Reinforcing steel splice length schedule

Lintel schedule(s)

Foundation Plan

Fully dimensioned foundation plan (references to the architectural drawings for foundation dimensions are unacceptable) including:

- Overall building dimensions
- Column gridlines
- Location of foundation elements with respect to column gridlines
- Size of all foundation elements
- Foundation wall thickness

Floor Framing Plan

Fully dimensioned floor framing plan (references to the architectural drawings for framing dimensions are unacceptable) including:

- Overall building dimensions
- Column gridlines
- Location of framing elements with respect to column gridlines
- Size and spacing of framing members
- Size and direction of span of roof sheathing or decking

Roof Framing Plan

Fully dimensioned roof framing plan (references to the architectural drawings for framing dimensions are unacceptable) including:

- Overall building dimensions
- Column gridlines
- Location of framing elements with respect to column gridlines
- Size and spacing of framing members
- Size and direction of span of roof sheathing or decking

Details

Foundation Details

Floor Framing Details

- Loading diagrams for special load cases for steel bar joists
- Column schedules for steel buildings
- Column and beam schedules for concrete buildings

Roof Framing Details

- Loading diagrams for special load cases for steel bar joists
- Column schedules for steel buildings
- Column and beam schedules for concrete buildings
- Prefab wood truss profiles with loading diagrams for all load cases

- Mechanical

Preliminary equipment sizes, locations, and capacities

Preliminary equipment layout plans for mechanical rooms

Floor plans for: HVAC, plumbing, and fire protection systems

Preliminary HVAC system schematics and flow diagrams

Acoustical and vibration control measures

Energy conservation measures

- Electrical

Power, telephone, and telecommunication distribution to project: plan and details

Site electrical plan showing routing with transformers, generators and vaults drawn to scale

Approximate sizes, locations and capacities of major components

Preliminary equipment layouts plan for electrical rooms

Roof plan for lightning protection

Floor plans for: lighting, power, telephone, security, fire detection systems

Light fixture schedule

Single line diagrams for: power distribution, fire alarm and security systems

- Class B estimate update

Based on completed Design Development documents, update quantity take-off.

Based on completed Design Development documents update estimate with more detailed engineering calculations, quantities, and pricing.

Cost estimate shall be prepared using MS Excel software program and shall comply with CSI's Master Format.

Outline Specifications

- Prepare a list of specification sections to be incorporated into the technical specifications of the Construction Document package for this project. Each specification section shall contain a description of the major and specialized construction materials proposed for use in this project. Outline specifications shall be in approved version of MS Word and numbering shall comply with CSI's Master Format.

Constructability Analysis

- NPS Checklist

Product File

- Product file of preferred/selected material samples and literature from all disciplines

CONSTRUCTION DOCUMENTS

Complete construction drawings shall be prepared in approved version of AutoCAD. They shall be developed from the approved design development drawings and embody adequate architectural, landscape architectural, civil, structural, mechanical, and electrical drawings showing details, dimensions, notational information and other data to ensure that the construction contractor has a complete understanding of all elements of work. All drawings shall be complete, cross-referenced, meet all requirements of NPS-10 and NPS CAD

standards, and coordinated between disciplines. This list is an outline of minimum drawing requirements. It is the A/E's responsibility to provide full and adequate drawings for each specific project.

Drawing Minimums

- Standard cover sheet (with park map and project location map)
- Index sheet (may be included on cover sheet)
- General:
    - Overall site plan showing total project:
        - Contractor staging areas (construction storage, field office, construction camp) with adequate space or sequencing needs
        - Construction limits
        - Construction access
        - Datum information, survey control
        - Monuments and benchmarks with coordinates and elevations
        - Property lines with bearings, easements, utility corridors and setbacks
        - Unique construction requirements
    - Sheet index, symbol legend and abbreviations list
    - Existing conditions plan:
        - Contours and spot elevations
        - Benchmarks with coordinates and elevation
        - Property lines with bearings, easements and setbacks
        - Buildings and other structures
        - Site features: roads, parking, structures, walks, steps, walls, etc.
        - Utilities, above and below ground, shown to scale (transformers, pull boxes, manholes, inlets, lift stations, propane tanks, septic tanks, culverts, etc.) include spot elevations for each, invert elevations for all below ground structures
        - Existing vegetation
        - Boring data
        - Construction Limits

- Civil Engineering
    - Utilities plans:
        - Existing conditions (as base)
        - Geotechnical testing areas, boring locations, percolation test holes
        - Water pumping, treatment, storage, and distribution system layout, size of components, profiles, material callouts
        - Wastewater collection, treatment, and disposal system layout, size of components, profiles, material callouts
        - Construction Limits
    - Road and Parking Layout:
        - Plan and profile
        - Road and parking cross-sections

Road and parking centerline stations, bearings, distances, and curve data
Intersections and other site radii identified with radius and coordinates
Control point and radius point tables
Storm water structure layout and details
System process and flow diagrams
Project details:
Details to include trenching details, thrust blocks, water/sewer line crossings, silt fence, sewer cleanouts, manholes, valves and boxes, curb stops, fire hydrants, air release valves, sewage air release valves, irrigation details, pressure relief valves, meters and boxes, pressure regulators, check valves and boxes, backflow preventors, septic tanks, absorption trenches, distribution boxes, piping connections, water well details, lift station details, storm water details, storage tank details, etc…

- Landscape Architecture
  Demolition Plan (if required):
  Structures
  Plant material (tree protection, plants to be removed or salvaged)
  Utilities (identified for removal or abandonment)
  Storm water protection
  Site furnishings
  Clearing and grubbing
  Rock outcrops
  Construction Limits
  Site Plan:
  Existing conditions
  Storm water protection
  Site features: roads, parking, structures, walks, steps, walls, etc.
  Utilities shown to scale (lighting, transformers, pull boxes, manholes, inlets, lift stations, propane tanks, septic tanks, culverts, etc.)
  Sections and elevations identified
  Site elements and details identified
  Construction Limits
  Site layout plan:
  Existing conditions (as base)
  Monuments and benchmarks identified with coordinates and elevation
  Roads, parking, walks and service areas:
  - Coordinates for building and site layout (identify location of point – foundation, finish wall. . .)

- Coordinates for all corner points of walks, parking, walls, and site features (identify location of point – foundation, face of curb. . .)
- Control point, corner point, and radius point tables
- Dimensioned traffic markings
- Dimensioned walks, steps, walls with footings, terraces, drainage and utility structures, and site elements

Buildings and structures:
- Finish floor elevations noted
- Roof overhangs, footings

Outdoor lighting
Above and below ground utilities (culverts, utility boxes to scale)
Construction Limits

Grading plan:
Existing conditions
Existing contours and spot elevations
Proposed grading:
- Proposed contours (maximum 2' contour interval with each 10' interval in heavier pen weight and labeled)
- Spot elevations at all change in gradient, at all corners of walks, walls, parking, drainage inlets and outlets, and all site elements
- Spot elevations at top and bottom of walls, steps and ramps
- High points, low points, swale centerlines
- Storm water protection elements
- Finish floor elevations at each access point of structures

. Tree and vegetation protection
. Utility systems
. Construction Limits

Planting/Revegetation/Irrigation plan
Plant list with quantities and symbols
Details and cross-sections

Site Details:
Paving, finishes
Erosion control (Storm water protection)
Accessibility
Stairs, handrails, ramps
Site furnishings
Typical and special construction details

Site Elevations:
Entrances
Exterior materials with major site elements
Dimensions

Site Sections:
Typical sections
Stairs
Site Walls

Material changes/connections, paving (curb/walk)
Key site elements

Sign Plan
Traffic signs (park wayfinding and MUTCD)
Accessible signs
Interpretive signs and waysides
Pedestrian and trail signs
Unique construction signs

- Architectural

General Sheet
Architectural symbol legend
Materials legend
Abbreviations list

Demolition Drawings with legends
Floor Plans
Roof plans
Elevations
Building Sections

New or Adaptive Use Drawings
Building Floor Plans:
- Spaces individually delineated and labeled
- Section cut references
- Enlarged layouts of special spaces (dimensioned)
- Dimensions (verified with structural)

Building Roof Plan:
- Drainage design with slope indicated
- Roof slope
- Dimensions

Building Elevations:
- Entrances, window arrangements, doors
- Exterior materials with major vertical and horizontal joints
- Roof levels
- Dimensions

Building Sections (One longitudinal and one transverse):
- Floor to floor dimensions with elevation targets
- Stairs and elevators
- Typical ceiling heights

General roof construction details
Roof and Window details referenced to plans and schedules
Typical and special construction details
Interior elevations
Reflected ceiling plans
Room finish, hardware, door and window schedules
Equipment layout
Keynotes contain full note, not specification number

CONDOC type notes are not acceptable
Keynote Legend shall be on the same sheet as keynote reference

- Structural
  - General Notes
    - Applicable Codes and Standards
    - Listing of design loads in accordance with IBC 2000, Section 1603
    - Listing of all structural materials used, including material strengths
    - Diaphragm fastening requirements
    - Requirements for special inspection IBC 2000, Chapter 17
    - List of abbreviations
    - Symbols legend
  - Standard Details
    - Standard details applicable to the project
    - Control joint details
    - Reinforcing steel splice length schedule
    - Lintel schedule(s)
  - Foundation Plan
    - Fully dimensioned foundation plan (references to the architectural drawings for foundation dimensions are unacceptable) including:
      - Overall building dimensions
      - Column gridlines
      - Location of foundation elements with respect to column gridlines
      - Location of slab edges
      - Location of control joints
      - Location of slab recesses
      - Location of elevator pits
      - Location of footing and foundation wall steps
      - Location of foundation wall masonry ledges
      - Size of all foundation elements
      - Foundation wall thickness
      - Top of footing elevations
      - Masonry ledge elevations
      - Top of wall elevations
      - All required section cuts
  - Floor Framing Plan
    - Fully dimensioned floor framing plan (references to the architectural drawings for framing dimensions are unacceptable) including:
      - Overall building dimensions
      - Column gridlines
      - Location of framing elements with respect to column gridlines
      - Top of beam elevations
      - Size and spacing of framing members
      - Locations of openings for floor penetrations
      - Size and direction of span of roof sheathing or decking

- Camber requirements
- All required section cuts

Roof Framing Plan

Fully dimensioned roof framing plan (references to the architectural drawings for framing dimensions are unacceptable) including:

- Overall building dimensions
- Column gridlines
- Location of framing elements with respect to column gridlines
- Top of beam elevations
- Size and spacing of framing members
- Locations of openings for roof penetrations
- Size and direction of span of roof sheathing or decking
- Camber requirements
- All required section cuts

Details

Foundation Details

- Footing/foundation wall details showing relationship to floor structural system
- Piling/pile cap details showing relationship to floor structural system

Floor Framing Details

- Connection Details
- Loading diagrams for special load cases for steel bar joists
- Column and base plate schedules for steel buildings
- Column and beam schedules for concrete buildings

Roof Framing Details

- Connection Details
- Loading diagrams for special load cases for steel bar joists
- Column and base plate schedules for steel buildings
- Column and beam schedules for concrete buildings
- Prefab wood truss profiles with loading diagrams for all load cases

- Mechanical

Mechanical floor plans (HVAC, plumbing, and fire protection), with all cross-references between sheets

Enlarged scale mechanical plans for mechanical rooms where all necessary plan information cannot be conveyed at a smaller drawing scale

Site mechanical plan (if applicable, with all features drawn to scale)

Detail drawings showing major mechanical details and sections, including all piping and ductwork connections to mechanical equipment

HVAC system schematics and flow diagrams

Mechanical symbols and abbreviations legends

Mechanical equipment schedules

Plumbing fixture connection schedule

Plumbing isometrics or riser diagrams for water systems and drain, waste, and vent (DWV) systems for each restroom, plumbing stack, or other groups of plumbing fixtures where all information cannot be shown on plan sheets

HVAC control schematics and sequences of operation

- Electrical

Electrical floor plans, with all cross-references between sheets

Enlarged scale electrical plans for critical spaces where all necessary plan information cannot be conveyed at a smaller drawing scale

Site electrical plan showing routing with transformers, generators and vaults drawn to scale

Detail drawings showing major electrical details and sections, including conduit routing to major electrical equipment

Branch circuiting for all electrical devices

Electrical symbols and abbreviations legends

Panelboard and light fixture schedules

Fire alarm matrix, riser and device location plans

Lightning protection plans

Telecommunication plans

Security system plans

Control wiring diagrams

Specifications and Product Information

A complete set of specification material including technical specifications, general requirements, contract bid schedules, list of required submittals, and a table of contents shall be prepared in accordance with the NPS "Guide for Specifiers" which prescribes, in part, that technical specifications shall be written in accordance with the Uniform System developed by the Construction Specifications Institute. The NPS Division 1 guideline specifications shall be edited to meet requirements of this job; other divisions may be from other sources. Include all supplemental design reports (soils, hazmat, etc.) with final specifications submittal.

Class A Estimate

The Class A estimate is based is based on complete quantity take-offs from completed construction drawings and specifications. Comply with bid schedule/Uniformat II (Level 2)/CSI Masterformat work breakdown structure. Submit unit costs for each bid item identifying the cost of equipment, materials, labor, and total for the work referenced. Prepare cost estimates using either an estimating software program or in MS Excel spreadsheet format. Format cost estimate with bid schedule. Support information includes:

- Final construction drawings and specifications
- Estimate based on complete quantity take-offs
- Final Bid Schedule or Price Schedule
- Show contractor's overhead and profit as well as general conditions as a separate cost item on the estimate
- Show General Requirements (General Conditions) costs in detail, not as a percentage of direct costs
- Total mark-ups (add-ons or escalations) at the end of the estimate for items such as overhead/profit, taxes, bonds, and location factors and do not allocate in each bid item

Product File

Submissions shall be bound, indexed, and shall include a table of contents and narrative, as necessary, to explain all work.

Construction Submittals

Use NPS template to prepare a list of submittal requirements for the final project.

O&M Requirements

Use NPS template to prepare summary of operation and maintenance (O&M) requirements

Design Calculations

Provide all design calculations used to arrive at the final design. Submissions shall be bound, indexed, and shall include a table of contents and narrative, as necessary, to explain all work.

- HVAC Design Calculations and Data:
  Building U value calculations for each conditioned building, demonstrating compliance with ASHRAE 90.1
  Heating and cooling load calculations for each building, including summaries of all input data, zoning maps, and any assumptions that were made
  Outside air (ventilation air) calculations
  Exhaust air calculations
  Psychometric calculations
  Heating, cooling, humidifying, and ventilating equipment sizing calculations
  Pump and fan static pressure calculations and selection curves
- Plumbing Design Calculations and Data
  Water service and sanitary sewer service capacity calculations for each building
  Roof drain and drain leader calculations for each building, as applicable
  Domestic water heater capacity calculations
  Fuel gas system capacity calculations for each building, if applicable
- Fire Protection Design Calculations and Data
  Hydraulic calculations for all fire sprinkler systems

Hydrant flow test data, if applicable
Fire pump and jockey pump capacity calculations, if applicable
Pressure tank capacity calculations, if applicable

- Electrical Design Calculations and Data
  - Electrical service calculations for each building
  - Fault current calculations and load summary
- Water/Wastewater Calculations and Data
  - Utility sizing calculations
- Structural Design Calculations and Data
  - Final structural calculations including:
    - Structural design criteria
    - References to applicable code sections (IBC, ACI, AISC, etc.)
    - References to applicable portions of the structure
    - Dead load calculations
    - Snow load calculations
    - Roof/floor live load calculations
    - Wind load calculations
    - Seismic load calculations
    - Gravity system calculations
    - Lateral system calculations
    - Connection design calculations
    - Foundation system calculations
- Earthwork Design Calculations and Data
  - Cut/fill calculations

Constructability Analysis

Use NPS template to complete the constructability checklist for the final project.